with enhanced new features and services. In 1996, TR-45.3 will undertake standardization of a new digital speech codec standard, as well as consolidation of the TDMA-related standards for both the 800 and 1800 MHz bands.

The TR-45.4 has completed standardization of auxiliary services based on the analog standard for in-building application. In addition, work on "A" interface standards dealing with the base-station-to-switch reference point was concluded with publication of IS-634, "MSC-BS Interface for Public 800 MHz." In 1996, the Subcommittee is expected to publish the next revision of the IS-634 standard that will support operations at both the 800 and 1800 MHz bands.

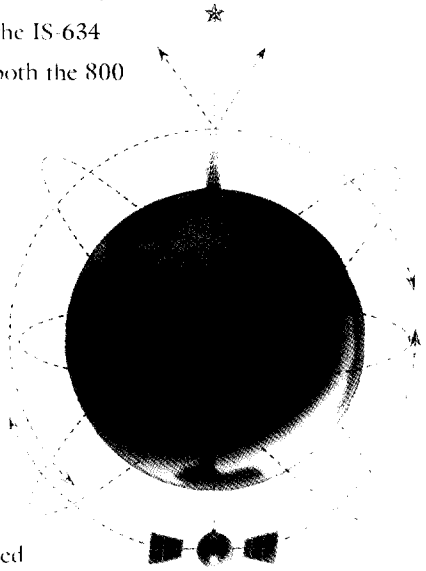
The TR-45.5 Subcommittee has concluded enhancements in several areas as they relate to IS-95 Code Division Multiple Access (CDMA)-based standards. Ballot of the proposed IS-99 "Data Services Option Standards for Wide Band Spread Spectrum Digital Cellular Systems," has also been concluded, dealing with CDMA data capabilities. Work on an Enhanced Variable Rate speech coder for IS-95, has concluded the milestone where a core algorithm has been selected and enhancements will now be evaluated as they proceed. Ballot and publication of the standard is anticipated in early 1996. Also in 1996, the Subcommittee will consolidate the CDMA-related standards at the 800 and 1800 MHz bands.

In support of its subcommittees, TR-45 has conducted Joint Experts Meetings (JEM) dealing with international roaming and emergency services. In addition, the Ad Hoc Authentication Group has defined an encryption algorithm for application to the data standards within TR-45.

In 1995, an ad hoc group on standards compatibility issues was created. Chaired by John McQueen, Southwestern Mobile Systems, the group has concluded an industry survey relative to Control Channel compatibility for the air-interface standards of TR-45, and will arrive at detailed recommendations early in 1996.

Representatives from both TR-45 and TR-46 participated in the annual meeting of the Working Party 8A (WP8A) of the International Telecommunication Union (ITU). WP8A is the ITU Radiocommunications Sector's group which adopts recommendations for terrestrial mobile radio systems. The U.S. delegation successfully affected adoption of 12 U.S. wireless standards.

Moving forward in 1996, TR-45 will address the convergence of standards activities to avoid duplicative effort and documentation. ■



TR-46

Mobile and Personal Communications 1800

Anil Kripalani
Chair, TR-46
Vice President, International Technology & Service Planning, QUALCOMM, Incorporated

TR-46 is authorized to develop and maintain performance, compatibility, interoperability and service standards for the Personal Communications Services (PCS) band, originally called the 1800 MHz band and now commonly referred to as the 1900 MHz band. With the Federal Communications Commission's (FCC) decision not to mandate a single standard, the current PCS standards allow the marketplace to choose between several technologies.

1995 Activities

The successful completion of the PCS A- and B-band auctions in 1995 has made it imperative that systems in the 1800 to 1950 MHz band be deployed promptly. With completion of the C-band auction, 1900 MHz equipment will proliferate, making it even more critical for approved industry standards to allow compatibility across different systems and for multiple manufacturers to supply equipment for PCS networks. In an effort to provide for greater choice in the marketplace, with multiple interface specifications supporting alternative system solutions, TR-46 has completed several standards for each of the air/network/intersystem interfaces.

The TR-46.1 Subcommittee, responsible for service descriptions and system requirements, recently completed Revision A of Interim Standard (IS) 104, "Personal Communications Service Descriptions for 1800 MHz." Work on IS-104 Revision B is planned. New requirements for the A-interface were completed in 1995 as part of Project Number (PN) 3307. The Subcommittee's work on Lawfully Authorized Electronic Surveillance (LAES) requirements as a result of the Communications Assistance for Law Enforcement Act (CALEA) will be refocused on specific aspects of DCS-1900. The overall framework of this project will be as specified in the TR-45 Committee as progress continues in that forum.

TR-46.2 is generally tasked with infrastructure standards to support Common Air Interface Standards (CAI) and is comprised of three working groups—Network Signaling (TR-46.2.1), responsible for Signaling System Number 7 (SS7) A-interface development; Intersystem Operations PCN-to-PCN (TR-46.2.2), responsible for Mobile Application Part (MAP) development; and Intersystem Networking (TR-46.2.3), responsible for "Interworking & Interoperability (I&I) Between Dissimilar MAPs" and network routing issues. TR-46.2's work on a number of projects has resulted in several interim standards: Integrated Services Digital Networks (ISDN)-based A-interface (IS-653), Frame Relay-based A-interface, SS7-based A interface (IS-651 Rev. A), SS7 Signaling Network Routing, DCS-1900 MAP (IS-652 Rev. A), PCS 1800

VICE CHAIR

TR-46
Stephen Jones
NEC America

SUBCOMMITTEES:

TR-46.1 Services And Network Reference Models
Chair: P.J. Louis, BELLCORE

TR-46.2 Network Interfaces
Chair: Douglas Rollender, AT&T Network Systems

TR-46.3 Air Interfaces
Chair: Tony Akers, Motorola

Privacy and Authentication (P&A) Ad Hoc
Chair: Vacant

Intercept Access Service Requirements, PCS 1800 Emergency Service Requirements, Interworking/Interoperability Between DCS-1900 and IS-41 Based MAPs.

IS-653 provides a standardized A-interface solution that utilizes the ISDN lower layers for call control, and Non-Call Associated Signaling to transport the Mobility Management Applications Protocol (MMAP) being developed by Subcommittee T1S1. The Frame Relay-based work and the Code Division Multiple Access (CDMA) parts of the third A-interface, the SS7-based A-interface document, IS-651, have been transferred to IS-634. IS-651 will now focus on DCS-1900 in its Revision A, currently in development.

In the area of Intersystem Operations (PCN-to-PCN), TR-46.2 is responsible for MAP work and has recently finished work on a Telecommunications Systems Bulletin (TSB) on IS-41, TSB 68, and on the DCS-1900 MAP, IS-652. The group's work on Revision A of IS-652 has begun.

TR-46.2 had intended to work jointly with TR-45 on LAES specifications. After reorganizing TR-46 in early 1996, the remaining work on LAES in this Subcommittee is intended to focus on DCS-1900 support. This document will then be used as input to the TR-45.2 LAES Ad Hoc Subcommittee.

The Interworking and Interoperability project in TR-46.2 is tasked to facilitate interworking and interoperability between systems using IS-41- and GSM based MAPs and to work on network routing issues. As PCS 1900 systems grow in popularity, interworking between systems will become even more important.

By way of background, late in 1992, an ad hoc Joint Technical Committee (JTC) on Air Interfaces was formed between TIA and Committee T1; the TR-46.3.3 Subcommittee is the TIA co-parent of the JTC. Seven Technical Ad-Hoc Groups (TAGs) were created to oversee the candidate air interfaces proposed for standardization. During 1995, the JTC completed recommendations for six air interfaces that were subsequently balloted. Several American National Standards Institute (ANSI) standards and TIA interim standards documents have resulted. The JTC was also responsible for the testing of six systems to correspond to the above air interfaces. Tests were performed at an industry testbed in Boulder, CO. Results were documented and are now available. Improvements to some standards have been balloted. After having fulfilled its mission and completed its work, the JTC will be disbanded.

In 1995, the Privacy and Authentication (P&A) Ad Hoc Subcommittee was responsible for generating the three-volume set of PCS P&A Requirements that included common requirements, as well as those that applied to DCS-1900 and IS-41 based systems. Some work has been merged with TR-45's Ad Hoc Subcommittee on P&A. DCS-1900 related work is expected to continue in TR-46 in 1996.

In the first half of 1996, TR-46 will undergo a reorganization, transferring the ongoing development of a portion of its standards work to other organizations in order to focus its attention in key areas. Participating in joint project work with other standards organizations will be explored throughout the year. ■

FO-2

Committee on Optical Communications Systems

Felix P. Kapron
Chair, FO-2
Principal Engineer,
BELLCORE

FO-2's charter is to develop physical-layer optical fiber system test procedures (OFSTPs) and system design guides and specifications to assist suppliers and users of fiber optic communications technology. The Committee's emphasis is primarily on the arrangement of components into a fiber optic link, rather than on the individual components themselves. The OFSTPs provide a standard way to measure system parameters so that results obtained by suppliers and users will agree with each other. Interoperability and multivendor compatibility are also important concerns of FO-2.

FO-2's six subcommittees address single-mode digital and analog systems, optically amplified systems with Wavelength-Division-Multiplexing (WDM), multimode fiber and multimode systems (primarily point-to-point local-area network applications). Other work includes optical system terms, definitions and symbols, optical cable placement, and system and active component reliability.

1995 Activities

Published in the past year, FO-2 has developed a guideline document which addresses Multimode Fiber Optic Link Transmission Design, TIA/EIA 626.

Work was begun in 1995 to extend EIA/TIA-559, the single-mode document, to include longer wavelengths, higher bit-rates, optical amplifiers, and WDM. Review work was also started on EIA/TIA-590, "Standard for Physical Location and Protection of Below Ground Fiber Optic Cable Plant." In the area of active component reliability, TIA/EIA-610, "Procedures for Calculating Optoelectronic Device Reliability," was made ready for reballotting.

Additional work includes studying OFSTPs for digital or analog systems which cover measurement of optical transmitter output power and installed cable loss. Digital test procedures address receiver sensitivity, electronic and optical jitter, reflections along the link, optical eye pattern, bit-error ratio, and single-mode dispersion power penalty. OFSTP 4, "Optical Eye Pattern Procedure," was published in 1995.

Analog test procedures, which in the coming year will complete balloting for publication, cover receiver sensitivity, Carrier-to-Noise Ratio (CNR), composite second-order distortion, composite triple-beat noise and cross modulation.

SUBCOMMITTEES:

FO-2.1/6.6 Joint Subcommittee on Single-Mode Systems
Chair: Allen Cherin, AT&T

FO-2.2 Subcommittee on Local Area Networks
Chair: Jim Kevern, AMP Incorporated

FO-2.2/6.6 Joint Subcommittee on LAN Component Characterization
Chair: Paul Reitz, AMP Incorporated

FO-2.4 Subcommittee on Optical Terms, Definitions, Document Control, and Safety
Chair: Joyce Kilmer, OPTOTEC

FO-2.5 Subcommittee on Outside Fiber Cable Plant
Chair: Paul Devaney, BELLCORE

FO-2.6/6.10 Joint Subcommittee on Reliability of Fiber Optic Systems and Active Optical Components
Chair: Hakan Yuce, BELLCORE

In 1995, FO-2 also continued to seek alliances with related industry associations as the convergence of technology remained a major focal point. Test procedures concerning the reliability of active components, system-level temperature cycle endurance tests, and the modal properties of light entering or leaving multimode components were among the areas of FO-2's interest. Updating glossaries on fiber optic terminology and graphic symbols were also on the Committee's agenda for the year.

FO-2 also maintains liaison with Subcommittee T1X1.5 on general test procedures and on optical amplifier operations, administration and maintenance.

In the international arena, close contact is maintained with international standards bodies. One is the International Electrotechnical Commission (IEC) Technical Committee 86 Fibre Optics, Subcommittee 86C Fibre Optic Systems, Working Group 1 on Fibre Optic Systems and Subsystems, and Working Group 3 on Optically Amplified Systems. Another is the International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) Study Group 15 on Transmission Systems and Equipment, and its Working Party 4 on Optical Transmission.

In this capacity, TIA documents, such as FO-2's work on single-mode and multimode system design guidelines, are reworked and forwarded as U.S. contributions to the international bodies. FO-2 made two such document submissions to the ITU. In 1995, there was growing interest in optically amplified subsystems, some incorporating wavelength-division multiplexing in which FO-2 serves as a body for U.S. review. The Committee is also adapting international work on extended single-mode systems and analog transmission into TIA documents.

In 1996, in addition to continuing projects in progress, FO-2 will address:

- Revision of the installed cable plan standard to include protective measures to reduce the probability of cable damage;
- Polarization-mode dispersion which can limit the bandwidth of long optically-amplified systems;
- Dispersion compensation that enables conventional 1310 nm fiber to be used in 1550-nm optically-amplified systems at long lengths;
- Accelerated measurement of bit-error ratios to determine values below 10 -15 in short periods of time;
- Power based measurement of optical extinction ratio, a new direct and accurate method;
- Measurement of fiber optic link optical return loss, particularly critical to analog or high-bit-rate systems;
- CNR of optically amplified systems;
- Gain and noise of optically-amplified WDM subsystems.

In 1996, the continuing thrust of FO-2 will be to produce new system design guidelines and system test procedures which reflect industry needs in the continuing advances of fiber optic communications technology. ■

FO-6

Fiber Optics

Edward F. Mikoski, Jr.
Chair, FO-6
Manager, Global Fiber Optic Standardization Programs, AMP Incorporated

FO-6 is responsible for developing standards for the components of fiber optics systems, including fibers, cables, splices, sensors, waveguides, connectors, optoelectronic sources and detectors, assembly tooling, and tools for maintenance. The FO-6 Committee also undertakes the standardization of test methods, terminology and symbology, and issues relating to quality assessment, reliability and intermateability. Since FO-6 uses the American National Standards Institute (ANSI)-accredited TIA standards development process for nearly all of its projects, the final publications are recognized as American National Standards. FO-6 is also a strong supporter of global standardization activities.

Since its inception, FO-6 has worked closely with the U.S. Department of Defense (DoD) in creating Fiber Optic Test Procedures (FOTPs). The DoD has consequently adopted many of these procedures along with documents addressing fiber optic terminology, graphic symbols, and fiber optic connector intermateability.

Additional work of FO-6 involves developing liaisons with system standardization efforts to contribute its component expertise as new areas begin to employ photons.

1995 Activities

FOTPs, compiled as the TIA/EIA 455 series of publications, were a major product of the Committee's work in 1995. Nearly 175 standards projects are in various stages of completion and more than 112 standards have been published as American National Standards.

In 1995, the FO-6.3 Subcommittee worked on Fiber Optic Connector Intermateability Standards (FOCIS), published in the TIA/EIA 604 series, which are a new approach to identify critical dimensions required for standardizing mating interfaces used by connectors and other components requiring connection to a system. Each standard contains the requirements that define the interface between the mating elements for a particular connector type. The standards may be applied to connections to optical devices as well as to fiber-to-fiber connections. These standards are one element in the overall connector specification system.

SUBCOMMITTEES:

FO-6.1 Fiber Optic Field Tooling & Instrumentation
Chair: Arthur Riedlinger, AT&T Network Systems

FO-6.2 Terminology, Definitions & Symbology
Chair: Edwin Sakaguchi, Structural Technologies Associates

FO-6.3 Interconnecting Devices
Chair: Tom Ball, AMP Incorporated

FO-6.5 Opto-Electronic Sources & Detectors
Chair: Cliff Carlson, NRaD - San Diego

FO-6.6 Fibers and Materials
Chair: Roy Love, Corning Incorporated

FO-6.7 Cables
Chairs: Eric Loytty, Siecor Corporation
Mike Kinard, AT&T

FO-6.8 Specification Structure & Processing
Chair: Steven Swanson, Corning Incorporated

FO-6.9 Fiber Optic Sensors
Chair: John Wahl, Corning Incorporated

FO-2.6/6.10 Reliability of Fiber Optic Systems and Active Optical Components
Chair: Hakan Yuce, BELLCORE

FO-6 addressed specifications covering most types of fiber optic components, as well as Fiber Optic Terminology as contained in the ANSI-recognized EIA 440 document. Members also focused on "Fiber Optic Graphic Symbols," EIA/TIA-587, the joint work of the FO-6 and FO-2 Committees. FO-6 participated in round-robin testing, often conducted in close concert with the U.S. National Institute of Standards and Technology (NIST), to evaluate new methods of measurement. A recent example is the international round-robin on fiber geometry being driven by FO-6.6.

Internationally, FO-6 contributes to the U.S. Department of State's U.S. National Committee Study Group C, a participant in the International Telecommunication Union's Telecommunications Standardization Sector (ITU-T) Study Group 15 Working Party 4. Additionally, contributions to international standards activities through the U.S. Technical Advisors to the IEC SC86A and SC86B and active member participation on international working groups have resulted in remarkably close harmony with documents produced within and outside the European Region. FO-6 made a total of 15 contributions to international standards organizations

In 1996 and beyond, FO-6 plans to strengthen the material contribution to the development of international standards and technology. Work on standards' harmonization development with international and regional standardization bodies to aid in the minimization of potential trade barriers remains a priority for the Committee in the ensuing years. In keeping with this goal, FO-6 plans to increase the number and quality of liaisons with other standards development organizations to assist in preparing fiber optic component standards for specific system application requirements.

FO-6 will also continue to study component reliability, especially the significant advancements in fiber. The reliability of passive components such as connectors will remain a key focus of the Committee's work.

As well, FO-6 will focus its attention on expanding the standardization of fiber optic technology to address the needs of National and Global Information Infrastructures (NII/GII) as once clear boundaries between telecommunications, data communications and multimedia applications begin to blur.

Committee activities anticipated in 1996 include:

- Pursue recognition as the U.S. coordination point for IEC Calibration Documents through the Metrology group, under Subcommittee FO-6.1;
- Standardize and enter EIA 440 Fiber Optic Sensor terms;
- Study reliability of adhesives in ferrules;
- Create standards for Angled End-Face connectors and array-type connectors;
- Publish the first several of a new series of FOCIS documents;
- Create standards for isolators;
- Work closely with DoD to create industry standards for transmitters and receivers;
- Engage in new standardization projects for plastic fiber;
- Develop, with the National Institute of Standards and Technology (NIST), Standardized Reference Materials (SRMs) for chromatic dispersion and Polarization Mode Dispersion (PMD). International round robins have already been conducted on fiber geometry, coatings, ferrule geometry, and pin gauges■

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Scope Communications
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Southern Company Services
Southwestern Bell Technology Resources
Sprint Cellular
Sprint Corporation
Sprint Local Telephone Division
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Teradyne Telecommunications Inc.
Telecom Nets Consulting
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Texaco
Texas Gas Transmission Corporation
Thomas & Betts Premise Wiring
Thought Communications, Inc.
Time Warner Telecommunications
Tower Technology
Trans-Media Group Inc.
UB Networks
Ungermann-Bass (Tandem)
Union Pacific Railroad
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Electro Federation of Canada (EFC)

Multimedia Telecommunications Association (MMTA)

National Electrical Manufacturers Association (NEMA)

Solar Energy Industry Association (SEIA)

United States Telephone Association (USTA)

TIA would like to thank the following companies for their generous contribution toward the production of the 1995 Standards and Technology Annual Report.

Alcatel NA Cable Systems, Inc.
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Ericsson, Inc.
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Motorola
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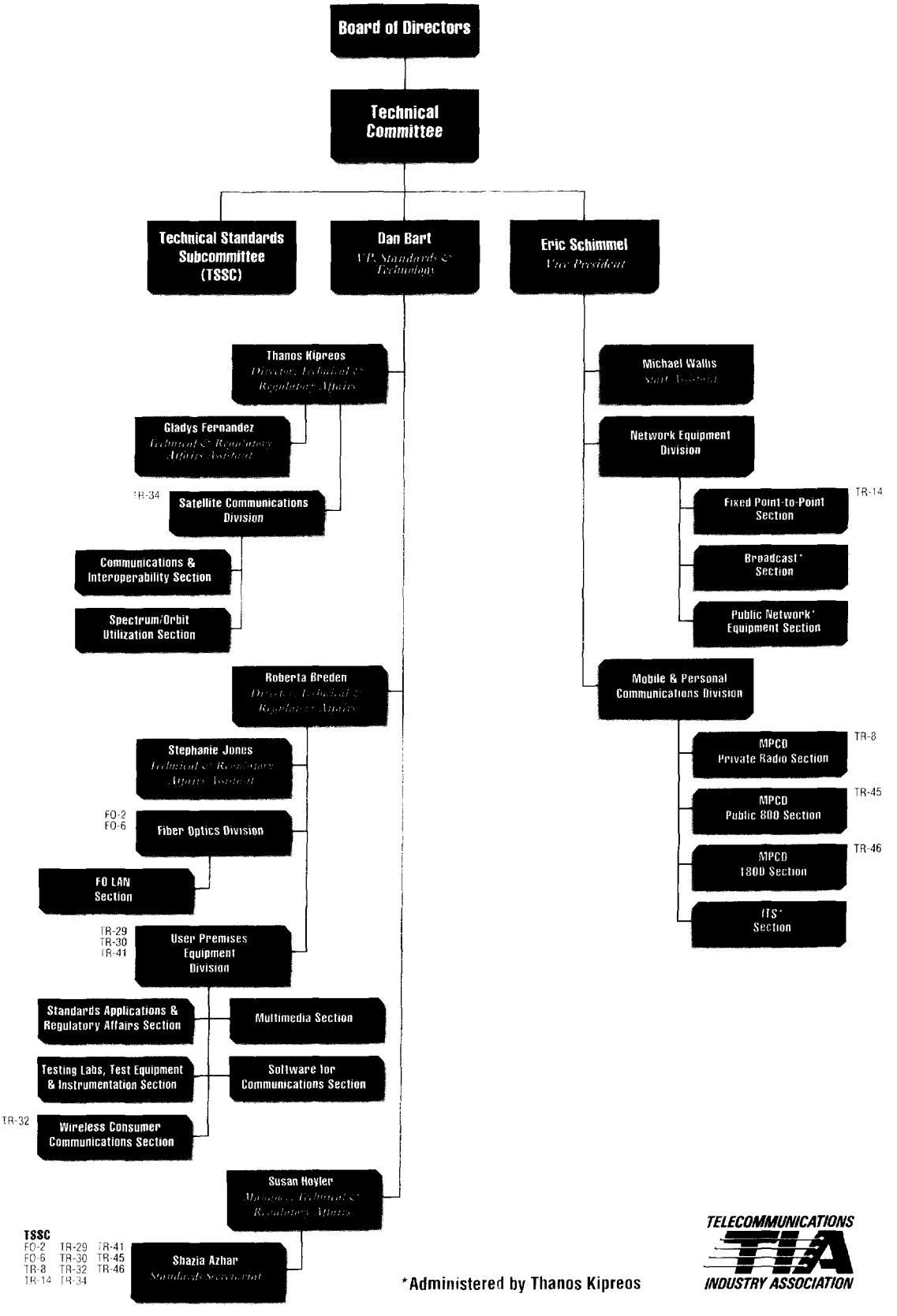
Siecor Corporation

STANDARDS AND TECHNOLOGY DEPARTMENT

Seated from left to right, *Eric Schimmel, Vice President; Thanos Kipreos, Director of Technical & Regulatory Affairs; Roberta Breeden, Director of Technical & Regulatory Affairs; and Dan Bart, EIA/TIA Vice President, Standards & Technology. Standing, from left to right, Gladys Fernandez, Technical & Regulatory Affairs Assistant; Michael Wallis, Staff Assistant; Stephanie Jones, Technical & Regulatory Affairs Assistant; Susan Hoyler, Manager, Technical & Regulatory Affairs; and Shazia Azhar, Standards Secretariat.*

ORGANIZATIONAL STRUCTURE

TIA Staff and Engineering Committees

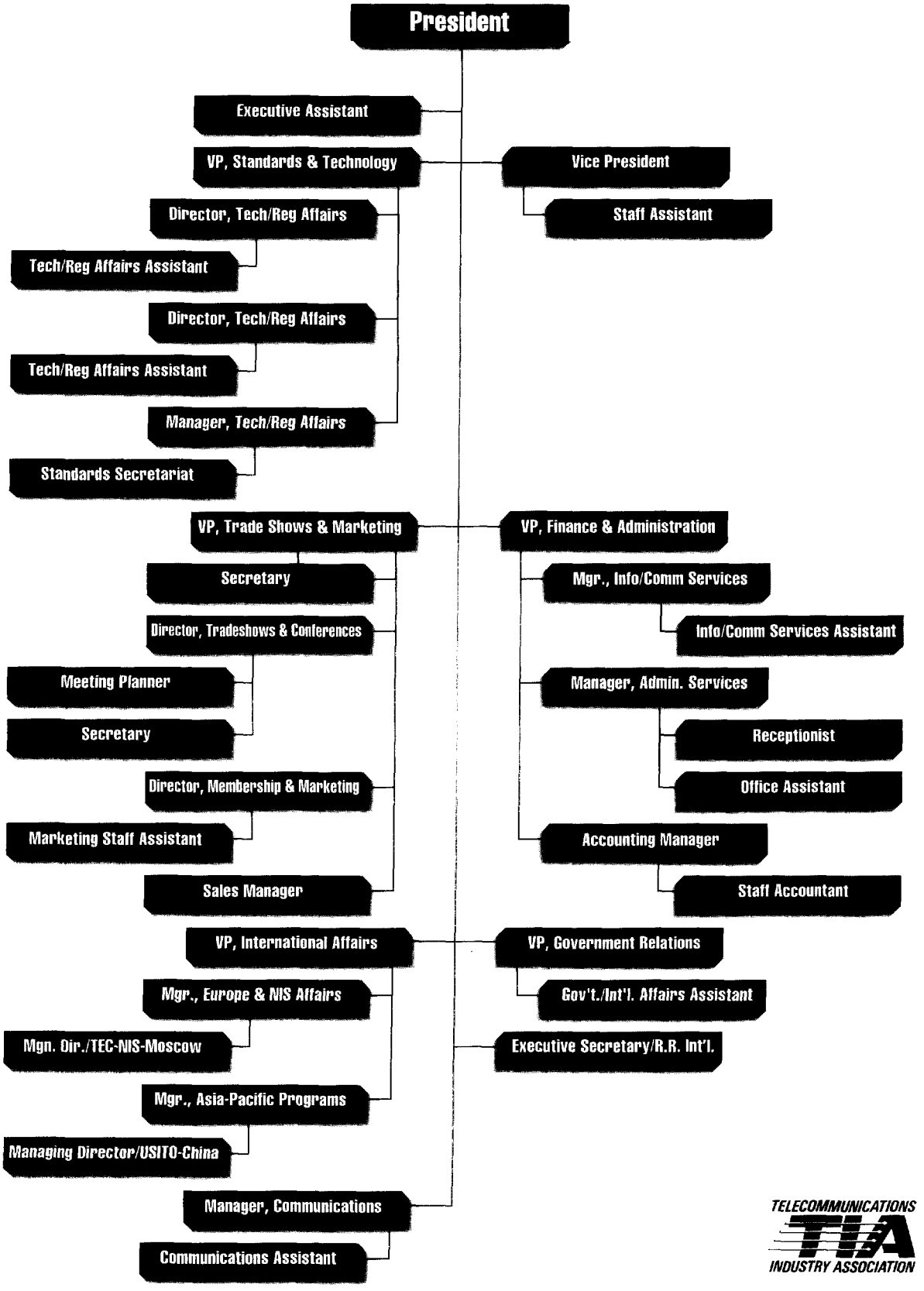


*Administered by Thanos Kipreos

TELECOMMUNICATIONS INDUSTRY ASSOCIATION

ORGANIZATIONAL STRUCTURE

TIA Staff



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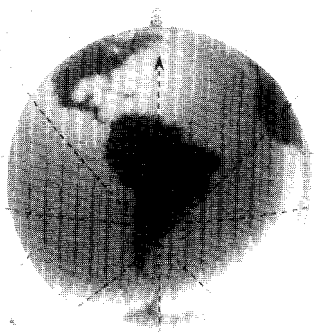

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